Amendment to the Claims

Please cancel claims 33 and 34 without prejudice to pursuing these claims in a continuation, divisional, continuation-in-part, or other application. Please withdraw claims 7, 8, 19 and 20 from consideration without prejudice to consideration upon allowance of a corresponding generic claim.

1. (Original) In chemical-mechanical planarization of microfeature workpieces, an abrasive element for use in a liquid planarizing slurry comprising:

a core having a first hardness, the core having an exterior surface and an interior, and the core being sized to be suspended in the liquid planarizing slurry; and

a plurality of abrasive particles having a second hardness different than the first hardness of the core, wherein the abrasive particles are at least partially embedded into the interior of the core.

2. (Original) The abrasive element of claim 1 wherein the core comprises a polymer and the abrasive particles comprise aluminum oxide, alumina, silicon oxide, coated silicon oxides, silica, cerium oxide, zirconium compounds, and/or titanium compounds.

3. (Original) The abrasive element of claim 1 wherein the core comprises a polymer, and the core has a size not greater than 50 µm.

4. (Original) The abrasive element of claim 1 wherein the core comprises a polymer, and the core has a size from approximately 0.1 µm to 10.0 µm.

5. (Original) The abrasive element of claim 1 wherein the core has a size from approximately 0.1 µm to 10.0 µm, and the abrasive elements have a size from approximately 1 nm to approximately 0.5 µm.

6. (Original) The abrasive element of claim 1 wherein the core has a size from approximately 0.1 μm to 10.0 μm, and the abrasive elements have a median size not greater than 50 nm.

7. (Withdrawn) The abrasive element of claim 1 wherein the core comprises a polymer, and wherein the abrasive particles comprise a plurality of first abrasive particles having a first composition and a plurality of second abrasive particles having a second composition different from the first composition.

8. (Withdrawn) The abrasive element of claim 1 wherein the core comprises a first material at the center and a second material coating the first material, and wherein the abrasive particles are at least partially embedded into the second material.

9. (Original) In chemical-mechanical planarization of microfeature workpieces, an abrasive element for use in a liquid planarizing slurry comprising:

a matrix material having a first hardness; and

a plurality of abrasive particles at least partially surrounded by the matrix material, wherein the abrasive particles have a second hardness independent of the first hardness of the matrix material, and wherein the matrix material and the abrasive particles together have a size and mass for being mixed with a liquid solution to form a planarizing slurry.

10. (Original) In chemical-mechanical planarization of microfeature workpieces, an abrasive element for use in a liquid planarizing slurry comprising:

a matrix material having a first hardness; and

a plurality of abrasive particles at least partially within and bonded to the matrix material, wherein the abrasive particles have a second hardness independent of the first hardness of the matrix material.

11. (Original) The abrasive element of claim 10 wherein the core comprises a polymer and the abrasive particles comprise aluminum oxide, alumina, silicon oxide,

coated silicon oxides, silica, cerium oxide, zirconium compounds, and/or titanium compounds.

12. (Original) The abrasive element of claim 10 wherein the core has a size from approximately 0.1 μm to 10.0 μm, and the abrasive elements have a size from approximately 1 nm to approximately 0.5 μm.

13. (Original) In chemical-mechanical planarization of microfeature workpieces, a planarizing slurry comprising:

a liquid solution; and

a plurality of abrasive elements mixed in the liquid solution, the abrasive elements comprising a core having a first hardness and a plurality of abrasive particles having a second hardness independent of the first hardness of the core, wherein the core has an exterior surface and an interior, and the abrasive particles are at least partially embedded into the interior of the core.

14. (Original) The planarizing slurry of claim 13 wherein the core comprises a polymer and the abrasive particles comprise aluminum oxide, alumina, silicon oxide, coated silicon oxides, silica, cerium oxide, zirconium compounds, and/or titanium compounds.

15. (Original) The planarizing slurry of claim 13 wherein the core comprises a polymer, and the core has a size not greater than 50 μm.

16. (Original) The planarizing slurry of claim 13 wherein the core comprises a polymer, and the core has a size from approximately 0.1 μm to 10.0 μm.

17. (Original) The planarizing slurry of claim 13 wherein the core has a size from approximately 0.1 μm to 10.0 μm, and the abrasive elements have a median size from approximately 1 nm to approximately 0.5 μm.

18. (Original) The planarizing slurry of claim 13 wherein the core has a size from approximately 0.1 μm to 10.0 μm, and the abrasive elements have a median size not greater than 50 nm.

19. (Withdrawn) The planarizing slurry of claim 13 wherein the core comprises a polymer, and wherein the abrasive particles comprise a plurality of first abrasive particles having a first composition and a plurality of second abrasive particles having a second composition different from the first composition.

20. (Withdrawn) The planarizing slurry of claim 13 wherein the core comprises a first material at the center and a second material coating the first material, and wherein the abrasive particles are at least partially embedded into the second material.

21. (Original) In chemical-mechanical planarization of microfeature workpieces, a planarizing slurry comprising:

a liquid solution; and

a plurality of abrasive elements mixed in the liquid solution, the abrasive elements comprising a matrix material having a first hardness and a plurality of abrasive particles at least partially surrounded by the matrix material, wherein the abrasive particles have a second hardness independent of the first hardness of the matrix material.

22. (Original) The planarizing slurry of claim 21 wherein the core comprises a polymer and the abrasive particles comprise aluminum oxide, alumina, silicon oxide, coated silicon oxides, silica, cerium oxide, zirconium compounds, and/or titanium compounds.

23. (Original) The planarizing slurry of claim 21 wherein the core has a size from approximately 0.1 μm to 10.0 μm, and the abrasive elements have a median size from approximately 1 nm to approximately 0.5 μm.

24. (Original) In chemical-mechanical planarization of microfeature workpieces, a planarizing slurry comprising:

a liquid solution; and

a plurality of abrasive elements mixed in the liquid solution, the abrasive elements comprising a matrix material having a first hardness and a plurality of abrasive particles at least partially within and bonded to the matrix material, wherein the abrasive particles have a second hardness independent of the first hardness of the matrix material.

25. (Original) The planarizing slurry of claim 24 wherein the core comprises a polymer and the abrasive particles comprise aluminum oxide, alumina, silicon oxide, coated silicon oxides, silica, cerium oxide, zirconium compounds, and/or titanium compounds.

26. (Original) The planarizing slurry of claim 24 wherein the core has a size from approximately 0.1 μm to 10.0 μm, and the abrasive elements have a median size from approximately 1 nm to approximately 0.5 μm.

27. (Original) A planarizing system for chemical-mechanical planarization of microfeature workpieces, comprising:

a support member;

a planarizing medium on the support member, the planarizing medium having a planarizing surface;

a workpiece holder configured to releasably retain a microfeature workpiece relative to the planarizing medium; and

a planarizing slurry disposed on the planarizing surface, the planarizing slurry comprising a liquid solution and a plurality of abrasive elements mixed in the liquid solution, wherein the abrasive elements comprise a core having a first hardness and a plurality of abrasive particles having a second hardness independent of the first hardness of the core, and wherein the abrasive particles are at least partially embedded into the core.

28. (Original) A planarizing system for chemical-mechanical planarization of microfeature workpieces, comprising:

a support member;

a planarizing medium on the support member, the planarizing medium having a planarizing surface;

a workpiece holder configured to releasably retain a microfeature workpiece relative to the planarizing medium; and

a planarizing slurry disposed on the planarizing surface, the planarizing slurry comprising a liquid solution and a plurality of abrasive elements mixed in the liquid solution, wherein the abrasive elements comprise a matrix material having a first hardness and a plurality of abrasive particles at least partially surrounded by the matrix material, and wherein the abrasive particles have a second hardness independent of the first hardness of the matrix material.

29. (Original) A planarizing system for chemical-mechanical planarization of microfeature workpieces, comprising:

a support member;

a planarizing medium on the support member, the planarizing medium having a planarizing surface;

a workpiece holder configured to releasably retain a microfeature workpiece relative to the planarizing medium; and

a planarizing slurry disposed on the planarizing surface, the planarizing slurry comprising a liquid solution and a plurality of abrasive elements mixed in the liquid solution, wherein the abrasive elements comprise a matrix material having a first hardness and a plurality of abrasive particles at least partially within and bonded to the matrix material, wherein the abrasive particles have a second hardness independent of the first hardness of the matrix material.

30. (Original) A method of processing a microfeature workpiece, comprising:

disposing a planarizing solution on a planarizing medium, the planarizing solution comprising a liquid solution and a plurality of abrasive elements mixed in the liquid solution, wherein the abrasive elements comprise a core having a first hardness and a plurality of abrasive particles having a second hardness independent of the first hardness of the core, and wherein the core has an exterior surface and an interior, and the abrasive particles are at least partially embedded into the interior of the core; and

removing material from a surface of the workpiece with the abrasive elements.

31. (Original) A method of processing a microfeature workpiece, comprising:

disposing a planarizing solution on a planarizing medium, the planarizing solution comprising a liquid solution and a plurality of abrasive elements mixed in the liquid solution, wherein the abrasive elements comprise a matrix material having a first hardness and a plurality of abrasive particles at least partially surrounded by the matrix material, and wherein the abrasive particles have a second hardness independent of the first hardness of the matrix material; and

removing material from a surface of the workpiece with the abrasive elements.

32. (Original) A method of processing a microfeature workpiece, comprising:

disposing a planarizing solution on a planarizing medium, the planarizing solution comprising a liquid solution and a plurality of abrasive elements mixed in the liquid solution, wherein the abrasive elements comprise a matrix material having a first hardness and a plurality of abrasive particles at least partially within and bonded to the matrix material, wherein the abrasive particles have a second hardness independent of the first hardness of the matrix material; and

removing material from a surface of the workpiece with the abrasive elements.

33-34. (Canceled)